This exam is closed book. No graphing calculators are allowed. No bathroom breaks are permitted while taking the exam. No cell phones are permitted. There are 15 questions, each is weighted equally. Good luck!

(1) Simplify the following expression: $\frac{9m^{-4}n^3}{12m^{-1}n^{-1}}$

(A) Cannot be simplified further
(B) $\frac{3n^4}{4m^3}$
(C) $\frac{9m^{-5}n^2}{12}$ (D) $\frac{3n^2}{4m^5}$

(2) Rationalize the expression: $\frac{\sqrt{3mn}}{3mn}$

(A) $\frac{1}{\sqrt{3mn}}$
(B) $\frac{1}{3mn}$
(C) $\frac{3mn}{9m^2n^2}$
(D) Cannot rationalize

(3) Is $3x^2 - 32x - 140$ factorable?

(A) Yes
(B) No

(4) If yes to number (3), factor it.

(A) $(3x + 7)(x - 20)$
(B) $(x + 10)(3x - 14)$
(C) $(3x + 10)(x - 14)$
(D) Cannot factor

(5) Find the sum of all even integers between 23 and 97.

(A) 2,124
(B) 2,352
(C) 2,200
(D) 2,220

(6) Find the infinite sum of the following geometric series if possible: 1, -3, 9,...

(A) Cannot sum
(B) 6.75
(C) 0.75
(D) 13.5

(7) Solve for x: $\frac{1}{9}(x - 18) - \frac{1}{7}(x + 7) = x + 9$

(A) $\frac{756}{79}$ (B) $\frac{378}{65}$ (C) $\frac{756}{65}$ (D) $\frac{126}{13}$

(8) Solve the inequality: $-13 \leqslant -3x + 2 \leqslant -7$

(A) [-5, -3]
(B) (-5, -3)
(C) [3, 5]
(D) (3, 5)

(9) Fill in the blanks: A horizontal line has a slope of _____ and a vertical line has a slope of _____.

(A) undefined, 0
(B) 0, undefined
(C) ∞, undefined
(D) undefined, ∞

(10) Find the standard form of the equation of the line with slope $= \frac{-2}{7}$ and passing through point (4,4).

(A) $2x + 7y = 36$
(B) $2x + 7y = -36$
(C) $2x - 7y = 36$
(D) $7x + 2y = -36$

(11) Find the standard form of the equation of the line passing through points (2, -6) and (-9, 6).

(A) $8x - 15y = -18$
(B) $-8x + 15y = -18$
(C) $12x + 11y = -42$
(D) $-12x + 11y = -42$

(12) Employees of some random firm are evaluated according to job performance and attitude. The results for 10 random employees are shown below.

Attitude (x)	59	63	65	69	58	77	76	69	70	64
Performance (y)	72	67	78	82	75	87	92	83	87	78

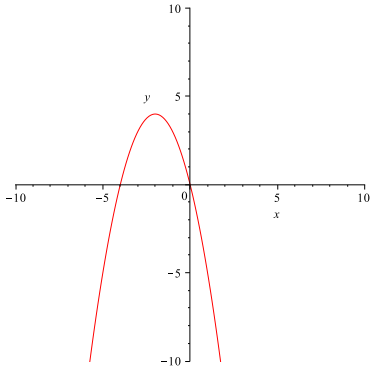
Find the regression line (linear model) that can be used to predict an employee's performance rating if their attitude rating is known.

(A) $y = -0.669x + 92.3$
(B) $y = 2.02x - 47.3$
(C) $y = 1.02x + 11.7$
(D) $y = 1.35x + 2.81$

(13) Find the domain and range of the function $g(x) = x^2 - 2$.

(A) Domain: $\mathbb{R}$; Range: $[-2, \infty)$
(B) Domain: $[2, \infty)$; Range: $\mathbb{R}$
(C) Domain: $\mathbb{R}$; Range: $[5, \infty)$
(D) Domain: $[0, \infty)$; Range: $[0, \infty)$

(14) Write an equation for the below graph in vertex form (i.e. $y = a(x-h)^2+k$).



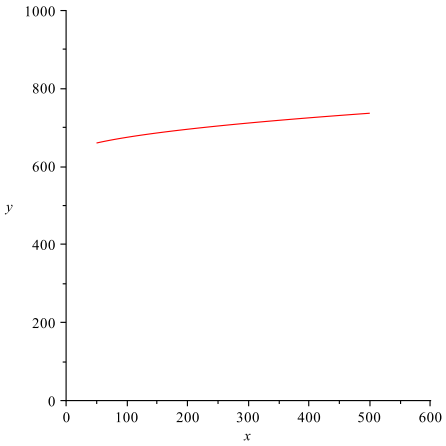
(A) $y = -(x - 2)^2 - 4$
(B) $y = (x + 2)^2 + 4$
(C) $y = (x + 2)^2 - 2$
(D) $y = -(x + 2)^2 + 4$

(15) Consider a retail chain selling cell phones. The retail price $p(x)$ (in dollars) and the weekly demand x for a particular phone are related by the function $p(x) = 625 - 5\sqrt{x}$, where $50 \leqslant x \leqslant 500$.

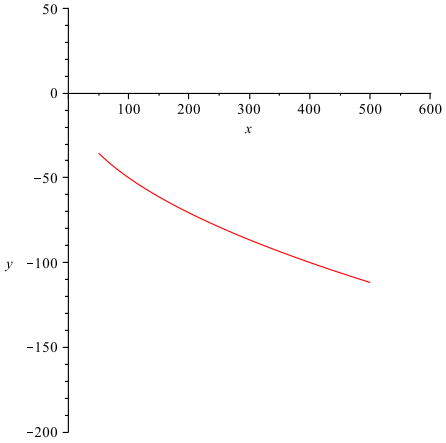
(i) Describe how the graph of the function $p(x)$ can be obtained from the graph of one of the six elementary functions: $y = x, y = x^2, y = x^3, y = \sqrt{x}, y = \sqrt[3]{x}$, or $y = |x|$.

(ii) Identify the plot of the function $p(x)$.

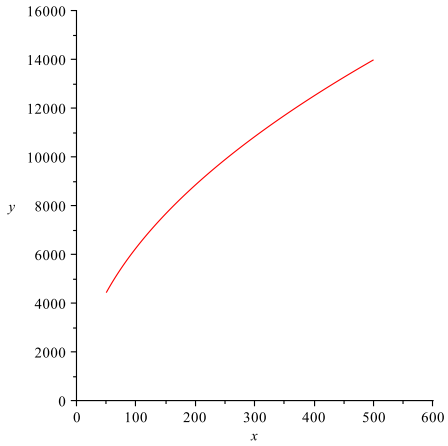
(A) (i) Graph of $y = \sqrt{x}$ is vertically expanded by a factor of 5, and shifted up 625 units.
(ii)



(B) (i) Graph of $y = \sqrt{x}$ is reflected in the x-axis and vertically expanded by a factor of 5.
(ii)



(C) (i) Graph of $y = \sqrt{x}$ is vertically expanded by a factor of 625 and shifted up 5 units.
(ii)



(D) (i) Graph of $y = \sqrt{x}$ is reflected in the x-axis, vertically expanded by a factor of 5, and shifted up 625 units.
(ii)