FINAL PROBLEM SET #3 *Practice True or False Questions*

1. The limit of the sequence $a_1, a_2, \ldots$ defined by $a_n = \left(1 + \frac{2}{n}\right)^{n/3}$ is 1.

2. The sequence $b_n = \sin(n^2\pi)$ diverges.

3. The area bounded by the curves $y = x$ and $y = x^3 - x$ is given by the integral

$$\int_{-\sqrt{2}}^{\sqrt{2}} [(x^3 - x) - (x)]\, dx.$$

4. If a certain spring is 1.5 m at rest and it takes 15 N of force to hold the spring at .5 m, then the amount of work done to compress the spring to .5 m is 30 N.

5. The sequence $\cos(n\pi)$ diverges.

6. If $f = O(g)$ and $g = O(h)$, then $f = O(h)$.

7. The x-value $x = 0$ is a critical point of the function $f(x) = \frac{1}{x}$.

8. The x-value $x = 1$ is a local minimum of the function $f(x) = \ln(x)$.

9. The absolute maximum and the absolute minimum of $y = x^3 - x$ on the interval $[-2, 1/2]$ are 0 and -10, respectively.

10. The function $f(x) = \ln|x|$ is differentiable at $x = -1$.

11. The derivative of $F(x) = \displaystyle\int_0^{x^2} \cos(t)\, dt$ with respect to x is $F'(x) = \cos(x^2)$.

12. The volume V of a solid with typical cross-section area given by $A(x) = \sqrt{9 - x^2}$, $0 \le x \le 3$, is $V = 3$.

13. The arc length of the curve $y = \frac{4\sqrt{2}}{3}x^{3/2} - 1$, $0 \le x \le 1$, is $\frac{13}{6}$.

14. Let $f(x)$, $g(x)$ be two continuous and differentiable functions satisfying $f'(x) = g(x)$ and $f''(x) = -f(x)$. Let $h(x) = f^2(x) + g^2(x)$. If $h(0) = 5$, then $h(10) = 5$.

15. The optimal radius of a can in the shape of a right circular cylinder which holds 125 cm^3 of volume and has an open top and which has the smallest possible surface area is $r = \dfrac{5}{\sqrt[3]{\pi}}$.