

## FALL- 2017 - CALCULUS 2 - TEST #1A - Solutions

True or false:

- T 1) If  $f(x) \leq g(x)$  on  $[a, b]$ , then the area between the curves can be written  $\int_a^b |f(x) - g(x)| dx$
- F 2) For the disk method of determining volume,  $dV = \pi[f(x)] dx$   $f(x)$  should be squared
- T 3) For the washer method of determining volume  $dV = \pi([f(x)]^2 - [g(x)]^2) dx$
- F 4) For the shell method of determining volume  $dV = 2\pi x^2[f(x)] dx$  only  $x$
- F 5) Carrying a five pound brick ten feet across a room requires fifty ft-lbs of work force and displacement are perpendicular
- F 6) Climbing down a ladder results in you doing positive work. gravity does work on you
- F 7) The area of the surface of revolution generated by  $y = f(x)$  from  $x = a$  to  $x = b$  is  $2\pi \int_a^b f(x) \sqrt{1 + f'(x)^2} dx$   $f'(x)$  should be squared
- F 8) Differential work by a pump can be written  $(\text{mass density}) \cdot (\text{height lifted}) \cdot d(\text{volume})$  no force without  $g$
- F 9) Work done by a spring with spring constant  $k$  being stretched  $x$  units is  $\frac{1}{2} kx^2$  work is done **on** the spring
- F 10) The weighted average of a function over  $[a, b]$  is  $\frac{1}{2}(f(a) - f(b))$  this isn't even the gross average
- F 11) The weighted average of a function over  $[a, b]$  is  $\int_a^b \frac{f(x)}{a-b} dx$  the negative of this
- F 12) The formula for integration by parts is  $\int u dv - \int v du = uv$  wrong sign of  $\int v du$
- T 13) The formula for integration by parts is  $-\int v du = \int u dv - uv$
- F 14)  $\int \sin^3 x dx$  can be integrated as a power function by first rewriting it as  $\int \sin^2 x d(\cos x)$  need  $-d(\cos x)$
- T 15)  $\int \sqrt{a^2 + x^2} dx$  may be simplified by setting  $x = a \tan \theta$
- T 16)  $\int \sqrt{a^2 + x^2} dx$  may be simplified by setting  $x = a \sinh u$
- T 17)  $\int \frac{xdx}{\sqrt{x^2 + 1}}$  may be simplified by setting  $u = x^2 + 1$
- F 18)  $\int \frac{dx}{\sqrt{x^2 + 1}}$  may be simplified by setting  $u = x^2 + 1$
- T 19)  $\int \frac{dx}{\sqrt{x^2 + 1}}$  may be simplified by setting  $x = \sinh u$
- T 20)  $\int \frac{d\theta}{2 + \sin \theta}$  may be simplified by transforming to a rational function in  $u$
- F 21)  $\int_0^\infty \frac{dx}{\sqrt{x}}$  is finite  $= \lim_{c \rightarrow 0} [2\sqrt{x}]_c^\infty = \infty$
- F 22)  $\int_0^\infty \frac{dx}{x^2}$  is finite  $= \lim_{c \rightarrow 0} [-\frac{1}{x}]_c^\infty = 0 + \lim_{c \rightarrow 0} [\frac{1}{c}] = \infty$
- T 23) Rational functions are continuous except at the roots of the denominator
- T 24) The partial fraction decomposition of  $\frac{x^2 + 5x - 11}{x^2(x + 1)^3}$  would consist of five terms
- F 25) The partial fraction decomposition of  $\frac{x^2 - 2x + 1}{x^2(x - 1)^3}$  would consist of five terms

$$\frac{x^2 - 2x + 1}{x^2(x-1)^3} = \frac{1}{x^2(x-1)}, \text{ so only three}$$